

A Pika's Place by Bobbie Snead and Terry Irish

Grade Band: 4-5	Literature: <i>A Pika's Place</i> Bobbie Snead and Terry Irish (Copies may be purchased through the Straub Environment Center)	Posted: Maureen Foelkl http://straubenvironmentalcenter.org/
<p>Brief Lesson Description.</p> <p>The students will become acquainted with a small mammal, the pika that lives in talus habitats. Students will become ecosystem engineers designing a rock model that replicates a smaller version of the rocks piles of a talus. They will measure daily temperatures (three times), recording their results. Students will understand what is needed for the survival of a pika.</p>		
<p>Essential Questions:</p> <p>How does matter cycle through ecosystems? How does the energy in an animal's food come from the sun? What role does a talus play over time as a climate sensitive habitat?</p>		
<p>Core Vocabulary: Energy Food Sun Growth Repair Motion Talus Pika Rock rabbit Temperature Predator Prey Indicator species</p>		
<p>NGSS Standards</p>		
<p>Standard: 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. Standard: 5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.</p>		
<p>Science & Engineering Practices: 4-LS1-1. Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Construct an argument with evidence, data, and/or a model. 5-PS3-1</p>	<p>Disciplinary Core Ideas: 4-LS1-1. Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. 5-PS3-1. Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.</p>	<p>Crosscutting Concepts: 4-LS1-1. A system can be described in terms of its components and their interactions. 5-PS3-1. Energy can be transferred in various ways and between objects.</p>
<p>Skills, Reasoning and Claims:</p> <p>4-LS1-1. Students make a claim to be supported about a phenomenon. In the claim, students include the idea that plants and animals have internal and external structures that function together as part of a system to support survival, growth, behavior, and reproduction. Identifying scientific evidence: Students describe the given evidence, including: i. The internal and external structures of selected plants and animals. ii. The primary functions of those structures Evaluating and critiquing evidence: Students determine the strengths and weaknesses of the evidence, including whether the evidence is relevant and sufficient to support a claim about the role of internal and external structures of plants and animals in supporting survival,</p>		

growth, behavior, and/or reproduction. Reasoning and synthesis: Students use reasoning to connect the relevant and appropriate evidence and construct an argument that includes the idea that plants and animals have structures that, together, support survival, growth, behavior, and/or reproduction. Students describe a chain of reasoning that includes: i. Internal and external structures serve specific functions within plants and animals (e.g., the heart pumps blood to the body, thorns discourage predators). ii. The functions of internal and external structures can support survival, growth, behavior, and/or reproduction in plants and animals (e.g., the heart pumps blood throughout the body, which allows the entire body access to oxygen and nutrients; thorns prevent predation, which allows the plant to grow and reproduce). iii. Different structures work together as part of a system to support survival, growth, behavior, and/or reproduction (e.g., the heart works with the lungs to carry oxygenated blood throughout the system; thorns protect the plant, allowing reproduction via stamens and pollen to occur).

5-PS3-1. Components of the model: Students use models to describe a phenomenon that includes the idea that energy in animals' food was once energy from the sun. Students identify and describe the components of the model that are relevant for describing the phenomenon, including: i. Energy. ii. The sun. iii. Animals, including their bodily functions (e.g., body repair, growth, motion, body warmth maintenance). iv. Plants. Relationships: Students identify and describe the relevant relationships between components, including: i. The relationship between plants and the energy they get from sunlight to produce food. ii. The relationship between food and the energy and materials that animals require for bodily functions (e.g., body repair, growth, motion, body warmth maintenance). iii. The relationship between animals and the food they eat, which is either other animals or plants (or both), to obtain energy for bodily functions and materials for growth and repair. Connections: Students use the models to describe causal accounts of the relationships between energy from the sun and animals' needs for energy, including that: i. Since all food can eventually be traced back to plants, all of the energy that animals use for body repair, growth, motion, and body warmth maintenance is energy that once came from the sun. ii. Energy from the sun is transferred to animals through a chain of events that begins with plants producing food then being eaten by animals

Common Core Standards:

ELA/Literacy Reinforcements: (W.4.1) (RI.5.7), (SL.5.5)

Mathematics (STEM) Reinforcements: (4.G.A.3) (MP.2), (MP.4)

Materials:

- *A Pika's Place* by Bobbie Snead and Terry Irish
- Rocks
- Science Notebooks
- thermometers
- dried large beans (lima)
- pencils
- rulers
- graph paper

LESSON PLAN – 5-E Model

ENGAGE:

Begin the lesson with holding up a photo of a pika (attached). What did you think this animal might be? Where does it live? Talk and turn to partners.

Next, hold up the book, *A Pika Place* and have the students compare and contrast the photo to the book jacket. Examine the back cover. Read aloud, "High in the mountains a little pika finds a home to call her own." What do you notice about this photograph? Is this the home of a pika? Why?

For the first read, have the students enjoy the text. Then have the students dig deeper for meaning, stopping often and adding I wonder statements as the teacher reads.

Read pages 3-5 Describe a pika's physical characteristics. Behavioral characteristics? What elements do talus habitats have in common? The author ends the last sentence with the statement, "That is the pika way." What is the pika way according to the author?

Read pages 6-7 How does a pika move through the talus? Why do you think a pika would need to move quickly? How do pikas mark their territory? The author once again ends the last sentence on the page, "That is the pika way." Does this sentence have the same meaning as the sentence on page 5? Why or why not.

Read pages 8-9 On page 8, the author repeats, "That is the pika way." Describe how a pika spends the afternoon? Why is this necessary for survival? What is a grizzled pika? How does the text support your thinking? Once again the author states, "That is the pika way." Describe the behavior of a pika guarding its territory. How do these behaviors ensure their survival?

Read pages 10-11 Does the photograph of the boot remind you of anything? Do you agree that a hiker would be a danger to a pika? Why or why not? Describe the events in the story that lead you to believe that the pika will / will not find a suitable territory.

Read pages 12-14 How does the pika tell other pikas that this is her territory? What were some of the pika's predators? Look at the photograph at the beginning of the story (pg. 3) and the photograph on page 13-14. How are the photographs the same? Different? What conclusions can you draw about, "That is the pika way?"

EXPLORE:

Read the following background information.

The pikas external structures support growth, behavior, reproduction and survival in the talus. These small warm-blooded animals lose their heat more quickly due to their size. Their body is rounded to help conserve heat. Because the pika is small, it must eat more frequently to keep its body healthy. The thick fur acts as an insulator. Pika's paws have fur that help create traction while scattering through the rocks. They have small, prominent external ears that assist with their keen sense of hearing.

Pikas can get too hot. They can die at temperatures as warm as 78 degrees Fahrenheit (25 degrees Celsius). If their boulder fields (talus) gets too warm, pika populations move or die.

Note: A talus are groups of rocks that are seven inches or larger.

Pikas can also get too cold. Talus habitats that get colder than 14 degrees Fahrenheit (-10 degrees Celsius) usually will not support pika colonies. They can survive a winter when there is a snowpack. This insulates them from the cold air temperatures. Pikas do not hibernate in the winter. For that reason, food storage is essential for survival.

After reading the paragraphs explain to the students that they are going to create a model rock tower. It will be important for the students to build their towers on soil, avoiding concrete. Teachers will need to find an area where the structures are less likely to be disturbed.

Students will choose from 5 to 9 rocks. They will find a location (teacher gives boundaries) to build their model. There must be an opening in their model in which they can place their lima bean pika and a thermometer.

Review the skills of reading a thermometer, making sure that students read the Celsius scale. Have the students measure and sketch their designs prior to collecting data.

Return to the rock towers to take temperature readings. Students will place their thermometers in the opening of their model. Leave the thermometers in the dwellings for two minutes to get a accurate reading. Have the students slide out the thermometers from the hole being careful to make quick and accurate readings. Have each student log their data into their science notebook. Make sure to spread the reading throughout the day.

Collect data for a week. Have students create graphs to explain their findings. Break into small groups and have each student present their information. Give students time to direct statements, I wonders and questions to the presenter.

EXPLAIN:

After the students have completed collecting data, gather them together as a group. Review the ideal temperature ranges for pika survival. In their science journals have them write a conclusion statement to the inquiry.

I would change _____ on my rock tower because _____.

My tower would or would not make a good home for a pika because _____.

The average temperature of my tower was _____.

Ask students what an indicator species refers to. As defined, " A species whose abundance in a given area is believed to indicate certain environmental or ecological conditions or suitable conditions for a group of other species." Explain that pikas are considered as an indicator species for determining the effect of climate change of ecosystems. Students can follow scientists at www.science-live.org as they research how pika's genes allow them to live in different elevations. To reinforce student understanding of how pika research is conducted, view <https://www.youtube.com/watch?v=woQftswDt6A>

Finally, ask the students to draw a conclusion about the inquiry. Students can view an on-going citizen science project, <http://blog.nature.org/science/2014/04/22/citizen-science-tuesday-pika-project-nature-conservation/> to explore the regions where pikas inhabit the earth.

Note: Author, Bobbie Snead is part of the pika citizen science project.

ELABORATE:

A Pike Place, has extended lessons that will compliment the above inquiry. "Rocks and Stones; Pebbles and Boulders," give students practice using their observation skills through drawing and writing. The next lesson is an art activity giving students a chance to venture into the world of visual arts while reinforcing their knowledge of a pika's habitat. The final activity from the text is "Pikas and Predators." This exercise provides physical movement that supports their understanding of the importance that all organisms play in the food chain.

Reinforcing concepts with active learning help students apply new knowledge. Students may collect grass blades from their playground or nearby park. Placing the grass blades (10 blades) near their structure, the students can evaluate the length of time it takes for the grass piles to dry. Asking probing questions during the inquiry. How long did it take your grass to dry? Did it matter how you piled up the blades? Did it increase or decrease the drying time? Why? Do you believe the pika creates piles of food in a particular order for drying purposes? If so, how? What happens if you store blades of grass that are not completely dry? What evidence do you have for your response?

EVALUATE:

Students can be evaluate through their science journaling, sketches, data collecting and graphs. Assessment of the student's final written paragraph can be used to check for understanding.

Sources:

Books:

- A Pika's Place, Bobbie Snead and Terry Irish, Wirthwhile Publishing, 2011.
- Pika: Life in the Rocks, Bill Tannis, Boyds Mill Press, 2010

Internet:

- <http://www.nwf.org/Wildlife/Threats-to-Wildlife/Global-Warming/Effects-on-Wildlife-and-Habitat/Pika.aspx> Pika in trouble, warming of the earth.
- <http://blog.nature.org/science/2014/04/22/citizen-science-tuesday-pika-project-nature-conservation/> Citizen Science project, report pika spottings,
- <http://www.adventurescience.org/pika.html> Explore place on earth where pikas inhabit

Videos

- <http://www.oregonwild.org/wildlife/american-pika> Information and video clips
- <https://www.youtube.com/watch?v=W4U9IhxQSTc> Pika calls
- <https://www.youtube.com/watch?v=W4U9IhxQSTc> Researching pikas
- <https://www.youtube.com/watch?v=woQftswDt6A> Researching pikas